



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
RISK REDUCTION ENGINEERING LABORATORY
CINCINNATI, OHIO 45268

137521

November 22, 1989

Mr. Paul H. Leonard
Civil Engineer
Hazardous Waste Management Division
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19017

Dear Paul:

Enclosed is the information that you requested on our in-house project regarding the C&R Battery Site. I apologize for not getting this information to you sooner.

This was a Category IV, "Proof of Concept Project" and used a minimum of duplicate and blank samples.

Sincerely yours

A handwritten signature in cursive script, appearing to read "Hugh".

Hugh B. Durham, Ph.D.
Physical Scientist
Treatment Technology Section
Hazardous Waste Treatment Branch
Water & Hazardous Waste Treatment Research Division

Enclosure

cc: J. Herrmann
E. Grossman

AR301437

LEAD REMOVAL FROM CONTAMINATED BATTERY SITE SOIL

Ernst Grossman and Hugh B. Durham, Ph.D.

INTRODUCTION:

This in-house project was based on a statement that Mr. S. Garry Howell found in the Kirk-Otmer Encyclopedia of Chemical Technology which said, "Zinc chloride is prepared by several methods. Roasted zinc sulfide ore, which usually contains lead, is heated with common salt, fuming off the lead and zinc as chlorides which are caught in a suitable bag room."

EXPERIMENTAL:

Soil adjacent to the C&R Battery Site outside Richmond, VA was collected on June 6, 1988 and used in this study. The soil was analyzed for lead using Method 3050. In this method, the sample is digested in nitric acid and hydrogen peroxide followed by an ammonium acetate digestion. The average of five analyses showed the soil to contain 0.38% lead. The target lead content for the soil was 18,500 mg Pb/kg soil. This is the average concentration of lead found at the site. With a background content of 3,800 mg Pb/kg soil an additional 14,700 mg Pb/kg soil should be supplied. For this study, 300 g of air dried soil was mixed with 6.6346 g of PbSO_4 . This mixture was blended wet in a mixer, oven dried at 100°C, and ground until 100% passed a 60 mesh sieve.

A series of tests were made to show the effect of temperature on the removal of lead from the soil. A second series of tests were made on the spiked soil to which sodium chloride had been added in a proportion equal to 120% of the stoichiometric requirements needed to convert PbSO_4 to PbCl_2 . The results of these tests are shown on the attached graph

COMMENTS:

Work on this project stopped in March 1989 due to our Laboratory reorganization and loss of our space at the Center Hill facility.

AR301438

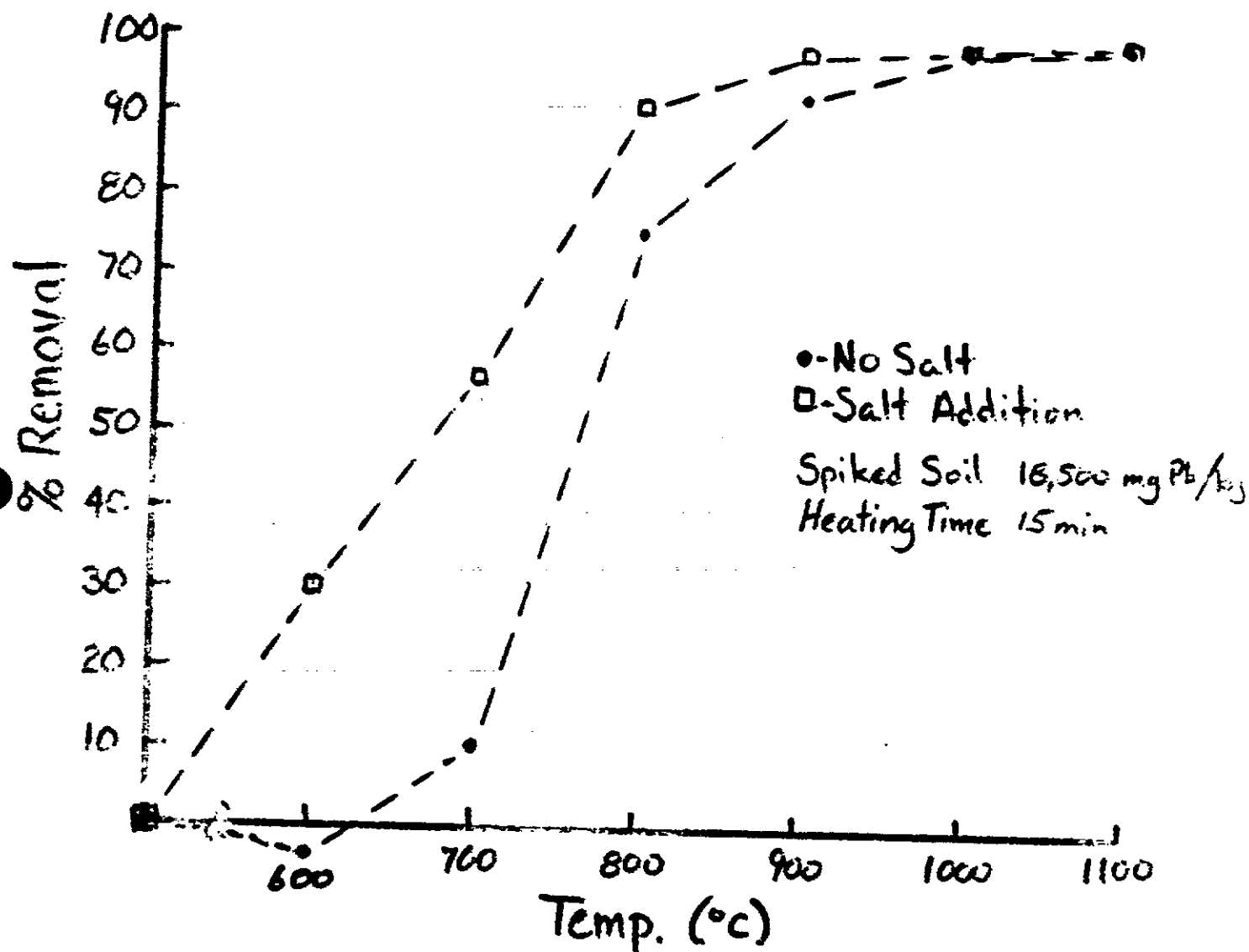
From this initial work, we feel the following statements are potential disqualifiers for this project:

- (a) Energy costs will be comparable to incineration.
- (b) Off-gas treatment costs may be high especially when HCl has to be treated.
- (c) Recovery of the volatilized heavy metal compounds from the gas phase may cause sever problems with respect respect to cooling, corrosion and aerosol collection.

AR301439

Date Jan 24-27, 1967

Lead Removal from Soil



AR301440